Citation:

Elgar FJ, Roberts C, Moore L, Tudor-Smith C. Sedentary behaviour, physical activity and weight problems in adolescents in Wales. *Public Health.* 2005 Jun;119(6):518-24.

PubMed ID: 15826893

Study Design:

Cohort Study

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

Based on data from a four year community cohort study, the researchers sought the following:

1. To describe the prevalence and stability of weight conditions from early to late adolescence,
2. To identify behavioral and social factors that co-occur with weight problems,
3. To study whether sedentary behavior and physical activity are predictive of body mass and change in body mass from early to late adolescence, and
4. To determine the extent to which physical activity mediates a relationship between sedentary behavior in early adolescence and body size in late adolescence.

Inclusion Criteria:

- Welsh adolescents who participated in the 1994 and 1998 Health Behavior of School-aged Children (HBSC) study with a cluster sample of 57 schools that represented a distribution of schools in Wales.
- Twenty three of the 57 schools were randomly selected to participate in this longitudinal study and 20 of them agreed, yielding 652 participants at baseline and 389 at follow up (355 participants for both baseline and follow up).

Exclusion Criteria:

Adolescents in private or special needs schools, street and incarcerated youth and all students absent from school on the day of the survey were excluded.

Description of Study Protocol:

Recruitment

Participants were recruited through public schools in Wales.

Design: Cohort study

HBSC Questionnaire was administered in the classroom February - March 1994 and February-March 1998. It assessed smoking, drug use, alcohol consumption, physical activity, general health, well being, social functioning and recurrent physical problems as well as determinants of health including school environment, parental support, peer interactions and demographics. Areas specific to this study included dieting, meal skipping, body satisfaction, feeling left out, number of hours per week exercising, watching television or playing computer games and incidence of bullying or being bullied.

Participant height and weight (shoes on) recorded on same day as questionnaire at years (grade) 7 and 11.

Blinding used

Participants were not told they would be weighed or measured until after the questionnaire was complete.

Intervention: not applicable

Statistical Analysis

SPSS version 12.0 for Windows (Chicago, IL)

- Group comparisons with ANOVA or chi square tests
- Multiple regression analysis for predictive and mediating factors

Data Collection Summary:

Timing of Measurements

- HBSC Questionnaire was administered in the classroom February - March 1994 and February-March 1998. It assessed smoking, drug use, alcohol consumption, physical activity, general health, well being, social functioning and recurrent physical problems as well as determinants of health including school environment, parental support, peer interactions and demographics. Areas specific to this study included dieting, meal skipping, body satisfaction, feeling left out, number of hours per week exercising, watching television or playing computer games and incidence of bullying or being bullied.
- Year/Grade 7 (February - March 1994)
- Year/Grade 11 (February - March 1998)

Dependent Variables

- Prevalence of weight conditions (% obese, overweight, normal weight, underweight)

Independent Variables

- Prevalence of dieting and/or meal skipping (% and standard deviation)
- Physical or sedentary activity (hours per week)
- Bullying behaviors (%)
- Body image (%)
- Peer interaction (%)

Control Variables

- Age
- Sex
- Weight
- Height
- BMI

Description of Actual Data Sample:

Initial N: 652 adolescents year 7 and 389 at year 11

Attrition (final N): 355 participants at both year 7 and 11 (45.5% attrition over time)

- Year 7: Male (293), Female (361)
- Year 11: Male (181), Female (211)

Age:

- Year 7: Male (11.76 $\pm$ 0.87 yr), Female (11.64 $\pm$ 0.84 yr)
- Year 11: Male (15.39 $\pm$ 0.50 yr), Female (15.35 $\pm$ 0.50 yr)

Ethnicity: not specified

Other relevant demographics: not specified

Anthropometrics

Location: Wales

Summary of Results:

Key Findings

There were no significant changes in the prevalence of weight conditions (underweight, overweight, obese) over time ($p<0.001$). BMI correlated year 7 to year 11 ($p<0.001$).

Obese adolescents (year 7) were most likely to have been bullied several times a week and to bully others least once. They were also most likely to report feeling left out and wanting to change something about their bodies and were more likely to skip breakfast. These behaviors were no longer significant at year 11 but obese adolescents continued to skip breakfast and snack more often.

Sedentary behavior at year 7 was predictive of body mass at year 11 ($p=0.006$).

Mediation by physical activity, either on BMI or on change in BMI, did not occur.

Characteristics of underweight, normal-weight overweight and obese adolescents in Years 7 and 11.

	Underweight	Normal	Overweight	Obese

Dieting (%)	2 (3.7) 0 (0.0)	54 (5.3) 24 (8.8)	52 (20.5) 20 (31.1)	29 (50.9), p<0.01 9 (60.0), p<0.01
Bullied (%)	1 (1.8) 1 (14.3)	36 (3.6) 11 (3.7)	10 (4.0) 1 (1.5)	9 (16.4), p<0.01 1 (6.3)
Bully others (%)	9 (16.1) 0 (0.0)	172 (17.2) 49 (16.7)	43 (17.0) 9 (13.4)	17 (30.9), p<0.10 1 (6.3)
Want to change body (%)	31 (56.4) 4 (57.1)	458 (46.2) 201 (68.4)	177 (70.8) 50 (75.8)	43 (76.8), p<0.01 14 (93.3), p<0.10
Feel unattractive (%)	7 (13.7) 2 (33.3)	195 (22.4) 63 (23.8)	56 (25.3) 27 (43.5)	16 (34.0), p<0.01 6 (50.0), p<0.01
Feel left out (%)	39 (70.9) 3 (42.9)	732 (73.8) 143 (48.6)	189 (75.9) 36 (55.4)	50 (92.6), p<0.05 9 (56.3)
Skip Breakfast (meals (SD))	0.99 (2.02) 3.86 (3.63)	1.29 (2.22) 2.05 (2.63)	1.75 (2.56) 2.70 (2.72)	2.01 (2.78), p<0.01 4.50 (3.23), p<0.01
Physical exercise (SD)	2.36 (1.92) 0.79 (0.86)	2.19 (1.86) 2.62 (2.02)	2.00 (1.79) 2.91 (1.96)	2.02 (1.88) 2.03 (1.78), p<0.05
Television (SD)	29.61 (15.48) 27.79 (17.52)	27.49 (15.71) 29.27 (17.24)	27.61 (14.88) 28.33 (13.98)	29.17 (15.30) 27.81 (15.73)

Author Conclusion:

The prevalence of overweight and obesity were within the expected range for British adolescents. Physical activity was related to subsequent change in body mass but was not predictive. Sedentary behavior predicted body mass but did not influence change in body mass. Sedentary behavior did not appear to displace time spent in physical activity. Promotion of healthy diets and physical activities may have long-term health benefits for adolescents.

Reviewer Comments:

Strength: consistent information for variety of behaviors as well as measured height and weight.

Weakness: anthropometrics measured with shoes on. Relatively small cohort size, only followed for 4 years, measurements only made at 2 time points.

Comment: Large numbers of adolescents reporting dissatisfaction with body image and feeling left out regardless of weight status may warrant further psycho-social assessment.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions

1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	???
3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	Yes
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes

3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	Yes
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	Yes
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	No
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	Yes
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A

6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	???
7.6.	Were other factors accounted for (measured) that could affect outcomes?	???
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	No
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes

	9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**		Yes
	10.1.	Were sources of funding and investigators' affiliations described?	Yes
	10.2.	Was the study free from apparent conflict of interest?	Yes